Carex tiogana (Cyperaceae), a New Sedge from the Sierra Nevada, California

Dean W. Taylor
University Herbaria, University of California, Berkeley, California 94720, U.S.A.

Joy Mastrogiuseppe
Department of Anthropology, Washington State University, Pullman, Washington 99164-4910, U.S.A.

ABSTRACT. *Carex tiogana* is described as a new species in section *Capillares* from the Sierra Nevada, California, similar to *C. capillaris* but with culms usually shorter than or equal to the leaves, serrulate leaf midribs, conspicuous riblike veins on abaxial leaf surfaces, no enlarged vein at leaf margin, long prickles on leaf margins and pistillate scale midribs, perigynia fewer per spike and usually shorter, with longer prickles toward beak, usually shorter beaks, and shorter achenes.

A diminutive plant belonging to *Carex* sect. *Capillares* Ascherson & K. Graebner was discovered in the Tioga Pass region on the eastern border of Yosemite National Park, Mono County, California. No member of section *Capillares* has previously been reported from California (Mackenzie, 1922; Howell, 1959). The section includes two species known to occur in North America: *Carex capillaris* L. and *C. williamsii* Britton (Mackenzie, 1931–1935: 295–297). *Carex williamsii* is known only from calcareous substrates in the high Arctic, while *C. capillaris* is a widely distributed circumboreal plant often subdivided into a number of infraspecific taxa or segregate species on the basis of growth habit, leaf width, the sex of flowers in the terminal spike, spike length, and perigynium size (Packer, 1983; Porsild & Cody, 1980; Scoggan, 1978; Polunin, 1943; Komarov, 1935). These segregate taxa, here treated as subspecies, are *C. capillaris* subsp. *chlorostachys* (Steven) Löve, Löve & Raymond, *C. capillaris* subsp. *krausei* (Boeckler) Böcher, and *C. capillaris* subsp. *porsildiana* (Polunin) Böcher.

Carex tiogana D. Taylor & J. Mastrogiuseppe, sp. nov. [sect. *Capillares*]. TYPE: U.S.A. California: Mono County, headwaters of Parker Creek drainage, Mono Basin, along trail between Parker Pass and Koip Pass, Inyo National Forest (37°49′28″N, 119°11′25″W), 3260 m, 17 July 1988, *D. W. Taylor & K. A. Teare 9981* (holotype, UC; isotypes, COLO, NY, US). Figure 1.

Planta cespitosa; folia longiora culmis vel aequa, arcuata vel falcata, crassa, nervata abaxialiter, margines foliorum serrulatae, 8–12 aculei per mm, aculeus 0.1–0.14 mm longus, costa abaxialis serrulata. Squamae feminae costae serrulatae, 7–15 aculei per mm. Periginia 2–5(–8) per spicam, (1.2–)1.3–1.8(–1.9) mm longa, binervata, nervi serrulati versus rostrum, aculei 6–15, aculeus 0.05–0.2 mm longus; rostrum (0.1–)0.3–0.5(–0.7) mm longum ad achenium. Achenia 0.8–1.1 mm longa.

Perennial, densely caespitose in small clumps. Culms 1.7–6(–7.3) cm, shorter than or about equaling the leaves (occasionally slightly longer). Leaves generally clustered on the lower one-quarter of the culm, blades thick, stiff, bright green, arching to falcate, channeled along the midrib, (1.3–)1.7–6.5 cm × 0.9–2.2(–3) mm, with 3–5 prominent veins abaxially but without thick vein at margin, margins and midrib with 8–12 stiff prickles per mm, prickles 0.1–0.14 mm long. Inflorescence bracts with sheath 3–5 mm long, blade 4–26 mm long. Terminal spike staminate, 5–8 mm long; staminate scales straw-colored with yellow serrulate midrib. Pistillate spikes usually 2 or 3, 3–5(–7) mm long, on slender ± nodding peduncles 8–11 mm long; pistillate scales ovate, shorter and wider than perigynia, white-hyaline with green midrib, the apex rounded or with a short-apiculate extension of the midrib, midrib of at least some lower scales bearing 7–15 prickles per mm (0.025–)0.5–0.7 mm long, scales deciduous as perigynia mature. Perigynia (2–)5–8 per spike, obovate, (1.2–)1.3–1.8(–1.9) × (0.4–)0.7–0.9 mm, trigonous, glossy, body green to brown (chestnut), with usually two yellow-green ribs bearing 6–15 prickles toward the beak, prickles 0.05–0.2 mm long; beak (0.1–)0.3–0.5(–0.7) mm from tip to achene. Achene trigonous, 0.8–1.1 × 0.4–0.8 mm, filling perigynium body; stigmas 3. The plants are more vigorous when garden-grown (in Berkeley, California, and Moscow, Idaho) but are still small with culms shorter than to somewhat longer than the leaves and retain the other characteristic features (Table 1).

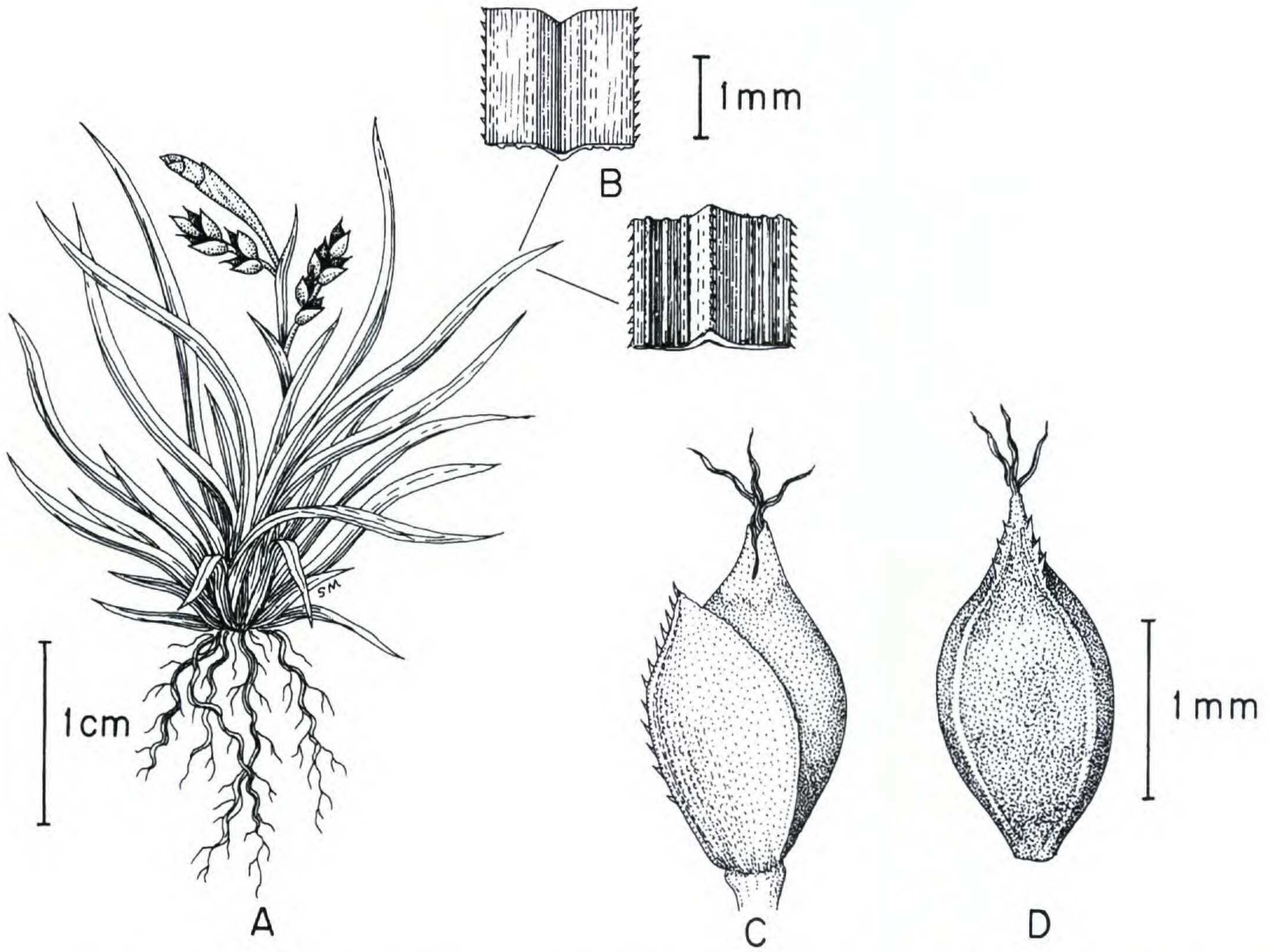

Figure 1. *Carex tiogana* D. Taylor & J. Mastrogiuseppe. —A. Habit. —B. Surfaces of leaf blade showing adaxial channeling, serrulate margins, abaxially riblike veins, and serrulate midrib. —C. Pistillate scale with perigynium (abaxial view). —D. Adaxial view of perigynium.

Carex williamsii is distinguished from the Sierran plants and from *C. capillaris* by having very narrow folded or involute leaves with 12–15 marginal prickles per millimeter and by perigynia usually having veins between the two ribs (Table 1). Characters distinguishing the subspecies of *C. capillaris* are listed in Table 1. The Sierran plants can be separated from *C. capillaris* without reference to geographic origin on the basis of culm length relative to leaves; leaf texture, venation, and prickles on midrib and margins; prickles on pistillate scale midribs; number of perigynia per spike; perigynium length, beak length, prickles, and stipe; and achene length (Table 1). Certain individual morphologic features of the Sierran plants occur in some populations of *C. capillaris*, but not in combination with other features characteristic of the Sierran plants.

The Sierran plant is currently known only from three small populations in Mono County, California, all beside lakes fed by glacial meltwaters and underlain by calcareous substrates. The clones of *C. tiogana* occupy small areas (no more than 400 m^2), making the species extremely vulnerable to human disturbance. *Carex tiogana* is both morphologically distinct and highly disjunct from other members of section *Capillares*. The closest stations are for *C. capillaris* subsp. *capillaris*, in the Ruby Mountains of east-central Nevada (Lewis, 1971)—400 km distant, and subspecies *chlorostachys* in the Wallowa Mountains of northeastern Oregon (Mason, 1975)—550 km distant.

Paratypes. U.S.A. **California:** Mono County, at the type locality, 10 Aug. 1986, *D. W. Taylor 8831* (UC, WS), 1 Aug. 1987, *D. W. Taylor 9198* (CAS, RSA, UC); marginal meadow at outlet of Cooney Lake, Virginia Lakes basin, Toiyabe National Forest (38°02′52″N, 119°17′01″W), 3102 m, 28 July 1988, *D. W. Taylor & K. A. Teare 9994* (UC, WS), 28 July 1988, *Glenn L. Clifton 18329* (PUA); turf bank at outlet of Upper Sardine Lake, Bloody Canyon, 3154 m, 24 July 1992, *D. W. Taylor 13061* (UC).

1a. Leaves 0.5–0.8 mm wide, most tightly folded or involute, margins with 12–15 prickles per mm . . . . . *Carex williamsii*

1b. Leaves 0.9–3 mm wide, most flat or shallowly channeled, margins with 0–12 prickles per mm.

2a. Culms usually longer than leaves, sometimes equaling leaves; leaf midribs abaxially smooth (occasionally serrulate at tip), prickles on leaf margins 0–0.08(–0.1) mm long; pistillate scale midribs usually without

Table 1. Comparison of the Sierran taxon with other members of *Carex* sect. *Capillares*.

	Sierran plants	*Carex capillaris* subsp. *capillaris*	subsp. *chlorostachys*	subsp. *krausel*	subsp. *porsildiana*	*Carex williamsii*
Growth habit	densely tufted	densely tufted	loosely tufted, rhizomatous	densely tufted	densely tufted	loosely tufted, rhizomatous
Leaf blades	thick, ± falcate	thick or thin, us. not falcate	thin, "grassy"	thick, not falcate	thick, occ. falcate	thick, not falcate
Leaf blade cross section	flat, shallow V, W	flat, shallow V, W	flat	flat, shallow V, W	flat, shallow V, W	folded or involute
Leaf blade width (mm)	0.9–2.2(–3)	(1.3–)1.7–2.2	1.4–2.4(–3)	1.6–2.5	(0.8–)1.3–1.8(–2.6)	0.5–0.8
Leaf veins thick, conspicuous abaxially	yes	no	yes or no	yes	no	no
Thicker vein at/near leaf margin	no	yes	us. yes	no	yes	yes
Leaf margin prickles/mm	8–12	0–11	(0–)5–11	8–10	0–12	12–15
Leaf margin prickle length (mm)	0.1–0.14	0–0.075(–0.1)	0–0.08(–0.1)	0.04–0.06	0.025–0.06(–0.1)	0.02–0.05
Leaf midrib serrulate abaxially (mid-length)	yes	no	no	no	no (rarely toward tip)	no
Culm height (cm)	1.7–6(–7.3)	(2.5–)8.5–46	(10–)15–50	3–21	(2.5–)5–23	3–30
Culm height/leaves	≤(slightly >)	>	> to >>	> to >>	> (=)	> to >>
Terminal spike	staminate	usually staminate	staminate	gynaecandrous	gynaecandrous	staminate or androgynous
Pistillate scale midrib prickles/mm	7–15	0(–15)	0(–16)	0	0(–20)	0
Pistillate scale prickle length (mm)	(0.025–)0.05–0.07	0(–0.03)	0(–0.05)	0	0(–0.05)	0
Perigynia per spike	2–5(–8)	5–12	8–14	6–12	9–16	6–8
Perigynium length (mm)	(1.2–)1.3–1.8(–1.9)	(2–)2.3–4.1	(2.1–)2.5–4.2	2.3–3	(1.5–)1.8–2.8	2.1–4
Perigynium width (mm)	(0.4–)0.7–0.9	0.7–1.2	0.8–1.3	0.7–1	0.6–1.1	0.7–1
Perigynium nerves (in addition to 2 ribs)	0	0 (few)	0	0	0	0–6
Perigynium transition to beak	abrupt	abrupt or tapering	tapering	tapering	tapering	tapering
Perigynium beak length to achene (mm)	(0.1–)0.3–0.5(–0.7)	(0.3–)0.6–1.7	0.6–1.4	0.7–1	0.4–1	0.7–0.9
Perigynium prickle number	6–15	0–5	0–7	0	0–3	0
Perigynium prickle length (mm)	0.05–0.2	0–0.05(–0.1)	0–0.05(–0.1)	0	0–0.05(–0.09)	0
Perigynium stipe (mm)	0–0.2	0.2–0.4(–0.6)	0.4–0.6	0.4	0.3–0.5	0.2–0.5
Achene length (mm)	0.8–1.1	(1–)1.3–1.8	1.2–1.8	1.2–1.3	1–1.9	1.1–1.5
Achene width (mm)	0.4–0.8	0.65–0.95	0.8–1	0.6–0.8	0.5–0.8	0.5–0.9

prickles (occasionally bearing prickles up to 0.05 mm long); achenes 1–1.9 mm long . . . . . *Carex capillaris*

2b. Culms shorter than or about equaling leaves; midribs of at least some leaves abaxially serrulate at midlength, prickles on leaf margins 0.1–0.14 mm long; pistillate scale midribs with 7–15 prickles (0.025–)0.5–0.7 mm long; achenes 0.8–1.1 mm long . . . . . *Carex tiogana*

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Literature Cited

Howell, J. T. 1959. *Carex. In:* P. A. Munz & D. D. Keck, A California Flora. Univ. California Press, Berkeley.

Komarov, V. L. [Editor]. 1935. Flora of the U.S.S.R. Vol. III. Botanical Institute, Academy of Sciences, U.S.S.R. [Translated from Russian, Israel Program for Scientific Translations (1964).]

Lewis, M. E. 1971. Flora and Major Plant Communities of the Ruby-East Humboldt Mountains, Nevada. U.S. Forest Service, Ogden, Utah.

Mackenzie, K. K. 1922. A monograph of the California species of the genus *Carex*. Erythea 8: 1–95.

———. 1931–1935. *Carex*. North American Flora 18: 9–478.

Mason, G. 1975. Guide to the Plants of the Wallowa Mountains of Northeastern Oregon. Museum of Natural History, University of Oregon, Eugene.

Packer, J. G. 1983. Flora of Alberta. 2nd Ed. Univ. Toronto Press, Toronto.

Polunin, N. 1943. Contributions to the flora and phytogeography of southwestern Greenland. J. Linn. Soc., Bot. 52: 349–406.

Porsild, A. E. & W. J. Cody. 1980. Vascular Plants of Continental Northwest Territories, Canada. National Museum of Natural Sciences Publications in Botany, Ottawa.

Scoggan, H. J. 1978. The Flora of Canada. Part 2, Pteridophyta, Gymnospermae, Monocotyledoneae. Publ. Bot. (Ottawa) 7(2).